

HUMAN OCCUPATIONAL ILLNESSES DUE TO EXPOSURE
TO PESTICIDES CONTAINING METHYL BROMIDE
REPORTED BY PHYSICIANS IN CALIFORNIA IN 1978

By

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HS-679 November 25, 1979

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SUMMARY

In 1978, California physicians reported 35 occupational illnesses and injuries resulting from exposure to fumigants containing methyl bromide. There were 22 reported systemic illnesses, 5 eye injuries, and 8 skin injuries. Information for this report was obtained from Doctor's First Reports of Work Injury and, where available, from follow-up investigations completed by county agricultural commissioners' staffs.

INTRODUCTION

There were 35 cases of occupational illness resulting from exposure to methyl bromide reported by California physicians in 1978. The most common cause of illness and injury was premature removal of injection hoses from beneath tarps or out of tree holes being fumigated prior to planting. Cylinder failures resulted in 2 fairly serious systemic illnesses. Rupturing of injection hoses resulted in 3 exposures. Three exposures, 2 of them resulting in serious illnesses, occurred while workers were engaged in activities preparatory to fumigation, such as attaching injection hoses. Three exposures resulted from improper opening of 1-pound cans of methyl bromide. Four police officers (2 incidents) were exposed to methyl bromide when they investigated burglaries at structures under fumigation with methyl bromide.

Methyl bromide is a colorless, nearly odorless gas which is applied as a pesticide from pressurized containers in which it exists in the liquid state. The boiling point is +3.5°C.

Products known to have been involved in human exposure incidents in California in 1978 include:

1. Brom-O-Gas (Great Lakes: EPA Reg. No. 5785-42 and 5784-4) methyl bromide 98%, chloropicrin 2%
2. Brom-O-Gas (Great Lakes: EPA Reg. No. 5785-55) methyl bromide 99.75%, chloropicrin .25%
3. Brom-O-Gas (Great Lakes: EPA Reg. No. 5785-8) methyl bromide 99.5%, chloropicrin .5%
4. Terr-O-Gas 75 (Great Lakes: EPA Reg. No. 5785-40) methyl bromide 75%, chloropicrin 25%
5. Terr-O-Gas 67 (Great Lakes: EPA Reg. No. 5785-24) methyl bromide 67%, chloropicrin 31.8%, inert ingredients 1.2%
6. Meth-O-Gas (Great Lakes: EPA Reg. No. 5785-41) methyl bromide 100%
7. Methyl bromide, 100% (Great Lakes: EPA Reg. No. 5785-51) methyl bromide 100%
8. Dowfume MC-2 (Dow Chemical: EPA Reg. No. 464-104) methyl bromide 98%, chloropicrin 2%
9. Methyl bromide 99.5% (Soil Chem. Corp. EPA Reg. No. 8536-12) methyl bromide 99.5%, chloropicrin 5%
10. Namfume (Namco: EPA Reg. No. 550-131) methyl bromide 99.75%, chloropicrin .25%
11. TriCon 45-55 (Tri Cal: Calif. Reg. No. 11220-50003) methyl bromide 45%, chloropicrin 55%.

Methyl bromide is a general-purpose fumigant used primarily for soil fumigation to control nematodes and weed seeds. It is also used as a commodity fumigant to control pests on grains, nuts, vegetables, and indoor plants, and to fumigate structures infested with insects.

Methyl bromide is applied to the soil as a gas, either by injection into the soil or by release under tarps above the surface of the soil. In most applications, the soil is covered with a tarp to prevent premature escape of the gas. Commodities are most often fumigated in a fumigation chamber. Granaries, trucks, ships, and structures may be fumigated under a tarp.

5,585,020 pounds of methyl bromide were reportedly used in California in 1978.

SUMMARIES OF CASES OF OCCUPATIONAL EXPOSURE INCIDENTS INVOLVING METHYL BROMIDE IN CALIFORNIA IN 1978

Systemic Illnesses

A worker in a nut processing plant was introducing Brom-O-Gas from a cylinder into a calibration unit, and the transfer hose ruptured. The force of the escaping gas or protective reflexes of the arms pushed the cartridge respirator from its proper facial positioning. The employee inhaled a substantial amount of gas and was taken to the hospital. He was hospitalized for 2 days. The physician on the case estimated this worker would miss 2 weeks of work and would need 1 week of modified work activity before fully recovering from his exposure.

A worker in a packing plant was exposed to Meth-O-Gas when the cylinder he was using to perform a fumigation failed, and a blast of methyl bromide struck him in the face and chest. He was thoroughly rinsed and taken to a physician. He then returned to work, wearing the same clothes he had been wearing at the time of the accident. That night, he began choking and was taken to a hospital burn unit in shock. He exhibited second and third degree burns over 40 percent of his body. Other problems included renal and liver toxicity and central nervous system problems. This worker sustained severe brain damage, and became permanently and totally disabled.

A worker in a packing plant was sprayed in the abdomen with methyl bromide when he accidentally turned the gas on while attaching the injection hose. He washed down with water but did not change his shirt. He went home and, at 2:30 in the morning, he awoke with pain and blistering in the exposed region. He went to a physician that morning and was treated for the blisters. He went back to a physician six days later complaining of diffuse back pain and chest pains, but no internal damage was diagnosed. He had not returned to work 22 days after the accident.

An employee for a structural pest control company was exposed to methyl bromide when a tank exploded and he inhaled fumes. He experienced dizziness and pain in his chest when he breathed deeply.

A highway patrolman was exposed to methyl bromide when he responded to a call to direct traffic around a chemical plant in which an explosion had just occurred. Not knowing he had been exposed, he went home and went to sleep. After realizing he had been asleep for 24 hours, and feeling weak and dizzy, he went to the hospital. The physician on the case estimated that this patient would lose 2 days from work.

A worker in a packaging plant opened the door of a fumigation chamber containing methyl bromide. He held his breath and shut the door. He experienced tightness in his chest. The symptoms were no longer present by the time he reached a physician.

A ranch hand removed a valve from a tank of compressed methyl bromide which had been left in the closed position. When he opened the valve, he heard gas escaping, gasped, and ingested a portion of the gas. He was treated by a physician who estimated a loss of 10 days' work time.

A new employee, who used all required safety equipment while working as a support swamper for a soil fumigation operation, complained of mid-back pains, chest pains, and difficulty in breathing. He was taken to a physician who did not make a blood-bromide analysis, but did diagnose the illness as bronchospasms secondary to methyl bromide exposure. Several other employees performing the same operations experienced no ill effects.

A fumigator was applying Brom-O-Gas in a 1-pound can to raisins under a tarp. He placed the can in extremely hot water before puncturing it with the applicator. When he punctured the can, excessive pressure, probably due to the hot water bath, caused the hose to break and pull from underneath the tarp, spraying him with gas. He experienced dizziness and was advised by the physician on the case of possible delayed symptoms.

A nursery worker was exposed to liquid methyl bromide when an apparently faulty application unit she was using sprayed the material on her hands. She experienced a headache and burns on her hands. She missed 1 day from work.

Three police officers responding to a burglary at a food market under fumigation with methyl bromide developed symptoms of methyl bromide poisoning. One of the officers had entered the building with a gas mask. The other 2 may have been exposed while standing at the entrance to the building or while handling stolen property which had been inside the building. The physicians on the case noted symptoms including severe headaches and itching in all 3 officers. They predicted that no time would be lost from work by any of the officers.

Two nursery employees became ill after working with soil that had recently been fumigated with methyl bromide. One experienced a headache and tight chest. The symptoms of the other worker were not known, but she missed an estimated 10 days of work.

A worker at a chemical plant experienced dizziness and weakness after exposure to methyl bromide.

A police officer was exposed to methyl bromide when he investigated a burglary at a house that was under fumigation. The physician on the case predicted that no time would be lost from work.

A nursery worker experienced dizziness and burning eyes after pulling a tarp off of soil boxes that had just been fumigated with methyl bromide (Brom-O-Gas). The investigator on the case noted that this employee is subject to dizzy spells. However, other employees at the work place experienced similar eye irritation.

A worker was exposed to methyl bromide while changing an injection line from one cylinder to another. The physician diagnosed the illness as a case of mild pharyngitis, and predicted no time would be lost from work.

An agricultural inspector entered a house which had been fumigated with methyl bromide, and the tarps had been recently removed. She experienced nausea, numbness, and tingling of the hands and feet. A physician examined her and found no evidence of methyl bromide toxicity.

An employee at a grain processing plant was exposed to Brom-O-Gas. The physician on the case diagnosed the illness as a case of gastroenteritis.

A PG&E worker was exposed to a mixture of methyl bromide and chloropicrin while at work. He developed intestinal discomfort plus tension aching of his jaws and teeth. These symptoms disappeared by the time he reached a physician. He had no residual symptoms.

Eye Injuries

A field fumigator placed a frozen can of Brom-O-Gas at the bottom of a deep hole. The area to be fumigated was half tarped with the hole in the center. He punctured the gas cylinder with a .22 caliber bullet, sending a stream of methyl bromide into his right eye. A physician diagnosed the injury as a slight case of conjunctivitis, and predicted that no time would be lost from work.

An orchard worker was metering out Soil Chemicals Corporation methyl bromide into a tree hole when the hose on the tank burst, spraying the material into his eyes. A physician diagnosed his injury as hyperemia of the sclera, and predicted that he would lose no time from work.

A worker was fumigating a small item under a tarp on the grounds of a fumigation company. He apparently removed the injection hose before all of the gas had been injected, and methyl bromide fluid sprayed into his left eye. The physician on the case estimated a 1-day period of disability. This injury could have been prevented if the employee had used the goggles which were required and reportedly provided by the employer.

An employee for a structural fumigation firm splashed methyl bromide into his eye while rolling up an injection hose. The physician diagnosed his illness as a case of perulent conjunctivitis of the left eye, and predicted that no time would be lost from work.

A park maintenance worker complained of eye irritation which he believed was caused by contact with methyl bromide fumes. A physician diagnosed the illness as a case of chemical conjunctivitis.

Skin Injuries

A fumigator for a seed company splashed liquid Tri-Con 45-55 (45% methyl bromide, 55% chloropicrin) on the left side of his face when he removed an injection hose from underneath a tarp. He went to a physician who diagnosed the injury as a chemical burn. He had reportedly been using all of the required protective equipment.

A field fumigator was using an iron bar, rather than an approved applicator to open a 1-pound can of Great Lakes Meth-O-Gas which he was using to fumigate holes for new tree plantings. He stepped on the cans to retrieve the bar, and methyl bromide sprayed onto his foot. He went to a physician who diagnosed the injury as first and second degree burns, and predicted he would lose 4 weeks' time from work and would be limited to modified work activity for another 4 weeks. This worker was not using the required safety equipment.

Two workers developed burning and blisters on their feet after working with 1-pound cans of Great Lakes Brom-O-Gas. They pulled the injection probe out of holes being fumigated and either spilled some of the material on their shoes or the lack of moisture in the soil resulted in leakage of the gas. Both were treated by a physician for first and second degree burns on the tops of their feet.

An employee at a date packing plant failed to bleed the hose on a cylinder of Great Lakes Brom-O-Gas and, in removing the hose, the material remaining in the line splashed on his wrist and neck. He went to a doctor and was treated for an irritative rash on his neck, forehead, and wrist.

An employee of a county agricultural commissioner, on his first day of work, was injecting methyl bromide into squirrel burrows, and developed a rash. The physician on the case diagnosed the reaction as allergic dermatitis, and estimated that this employee would miss two weeks of work.

A field fumigator placed a 1-pound can of methyl bromide, Dowfume MC-2, in his back pocket. He experienced burning and irritation on his left hip.

A county employee developed contact dermatitis and a chemical burn after methyl bromide liquid leaked onto his right foot.

DISCUSSION

Methyl bromide is a commonly used fumigant throughout California. In addition to being a soil fumigant, it is used for commodity, structural, nursery, and greenhouse fumigations. Like any other pesticide, the use of methyl bromide must be accomplished in strict accordance with the registered label. All safety information must be rigidly followed if worker injury is to be avoided.

The categories of accidents reported during 1978 are similar to those reported in previous years. While the total was slightly lower, there was a significant increase in illnesses and injuries associated with usage of methyl bromide packaged in 1-pound cans. This increase is of particular concern because the majority of reported illnesses involved individuals whose employment involves pesticide application, not the home and garden user.

A major cause of illness was application equipment failure. The secondary cause was a lack of adequate safety and application knowledge. In both cases, a dynamic employee safety program could have alerted the applicators to possibly unsafe conditions, thereby decreasing the probability of worker exposure.

Equipment failure, i.e., transfer hose rupture, cylinder or valve failure, is difficult to prevent; however, by conducting a thorough preapplication inspection of all equipment, faulty units can be identified and replaced. It is important to immediately notify the fumigant registrant of any defective equipment so that a safety alert can be transmitted to all users.

The only successful measure that can be taken by anyone using methyl bromide is continual safety education. It is imperative that all users be familiar with the hazards incumbent with methyl bromide fumigation. The product label will serve as an adequate starting point for safety training. The label information must be expanded upon to include supplemental information and training dealing with the proper use of safety equipment. In particular, the when and how to use respirators must be continually reviewed to ensure individual safety.

Only when proper safety and use measures are followed can the worker's exposure be significantly reduced.